


## DECLARATION OF DR. GARY L. TURNER

I, Gary L. Turner, declare and state that:

1. I received a Bachelor of Science degree in Chemistry from the University of Illinois, Urbana, Illinois in 1978 and a Doctorate degree in Physical Chemistry at the University of Arkansas, Fayetteville, Arkansas in 1982.
2. From July 1982 to June 1988, I was a research associate for Dr. E. Oldfield, at the University of Illinois, Urbana, Illinois.
3. From August 1985 to the present, I have been employed by Spectral Data Services, Inc., where my duties include conducting Nuclear-Magnetic-Resonance scans on sample materials.
4. From April 1986 to August 1990 I was also employed as the Vice-President of Probe Systems, Inc., where I was responsible for designing Nuclear-Magnetic-Resonance (NMR) equipment.
5. I have published 38 peer-reviewed scientific papers, a list of which is shown in the Attachment.
6. Over the last year, I conducted  $^1\text{H}$  MAS NMR scans on about 100 blind samples of compounds provided by BlackLight Power, Inc.
7. A 270 MHz NMR Spectrometer, operating at a Larmor frequency of 270.6196 MHz was used. The Spectrometer was equipped with a Tecmag operating system and Henry Radio amplifiers for pulse generation. The probe was a 7 mm Doty Scientific Standard Probe. The data was collected with a pulse angle of about  $35^\circ$ , with a two second delay between pulses. The samples were spun at two speeds, usually at 4.5 and 3.5 KHz, to identify the spinning sidebands. Typically, 200 transients were collected for each spectrum. The data was processed using NUT (Acorn NMR, Inc.) software.
8. Some of the samples showed signals in regions that are not typical. Most  $^1\text{H}$  MAS NMR signals are observed from about 10 to 0 ppm, where ppm represents the shift from the control sample, tetramethylsilane. Signals were observed at -4 to -5 ppm. Since 1978, I have been primarily conducting NMR scans and I have never observed signals in the region of -4 to -5 ppm before.
9. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

By   
Dr. Gary L. Turner

Date: 5/18/00

## ATTACHMENT

### Published Papers of Dr. Gary L. Turner

1. G. L. Turner and E. Oldfield, "Effect of a local anaesthetic on hydrocarbon chain order in membranes," Nature **277**, 669-70 (1979).
2. J. F. Hinton, G. L. Turner, and F. S. Millett, "A thallium-205 NMR investigation of the thallium(I)-gramicidin complex," J. Magn. Reson. **45**, 42-47 (1981).
3. G. L. Turner, J. F. Hinton, and F. S. Millett, "A thallium-205 NMR study of thallium acetate ion association in 2,2,2-trifluoroethanol and dimethylsulfoxide," J. Sol. Chem. **11**, 379-86 (1982).
4. G. L. Turner, J. F. Hinton, and F. S. Millett, "Thallium-205 nuclear magnetic resonance study of the thallium(I)-gramicidin A association in trifluoroethanol," Biochem. **21**, 646-51 (1982).
5. J. F. Hinton, G. L. Turner, G. Young, and K. R. Metz, "Thallium-205 NMR studies of the Tl(I) ion complexation by gramicidin in non-aqueous and micelle solutions," Pure & Appl. Chem. **54**, 2359-68 (1982).
6. G. L. Turner, J. F. Hinton, and F. S. Millett, "A <sup>205</sup>Tl and <sup>13</sup>C NMR study of the Tl(I)-gramicidin A association in dimethylsulfoxide," J. Magn. Reson. **51**, 205-12 (1983).
7. G. L. Turner, J. F. Hinton, R. E. Koeppe II, J. A. Parli, and F. S. Millett, "Difference in association of Tl(I) with gramicidin A and gramicidin B in trifluoroethanol determined by Tl-205 NMR," Biochim. Biophys. Acta. **756**, 133-37 (1983).
8. J. F. Hinton and G. L. Turner, "Tl-205 and C-13 NMR study of the Tl(I)-enniatin B complex," J. Magn. Reson. **59**, 262-67 (1984).
9. R. J. Kirkpatrick, K. A. Smith, S. Schramm, G. L. Turner, and W. H. Yang, "Solid-state nuclear magnetic resonance spectroscopy of minerals," Ann. Rev. Earth Planet Sci. **13**, 29-47 (1985).
10. J. F. Hinton, K. R. Metz, G. L. Turner, D. L. Bennett, and F. S. Millett, "Solid-state thallium-205 NMR study of the gramicidin and lasalocid Tl(I) complexes," J. Magn. Reson. **64**, 120-123 (1985).

11. G. L. Turner, S. E. Chung, and E. Oldfield, "Solid-state oxygen-17 nuclear magnetic resonance spectroscopic study of the group II oxides," J. Magn. Reson. 64, 316-324 (1985).
12. R. J. Kirkpatrick, T. Dunn, S. Schramm, K. A. Smith, R. Oestrike, and G. Turner, "Magic-angle sample-spinning nuclear magnetic resonance spectroscopy of silicate glasses: a review," in Structure and Bonding in Non-Crystalline Solids, eds., G. E. Walrafen and A. G. Revesz, 303-327 (1986).
13. G. L. Turner, K. A. Smith, R. J. Kirkpatrick, and E. Oldfield, "Boron-11 nuclear magnetic resonance spectroscopic study of borate and borosilicate minerals, and a borosilicate glass," J. Magn. Reson. 67, 544-550 (1986).
14. A. C. Kunwar, G. L. Turner, and E. Oldfield, "Solid-state spin-echo Fourier transform NMR of  $^{39}\text{K}$  and  $^{67}\text{Zn}$  salts at high-field," J. Magn. Reson. 69, 124-127 (1986).
15. H. K. C. Timken, G. L. Turner, J. P. Gilson, L. B. Welsh, and E. Oldfield, "Solid-state oxygen-17 nuclear magnetic resonance spectroscopic study of zeolites and related systems. I.," J. Amer. Chem. Soc. 108, 7321-7235 (1986).
16. H. K. C. Timken, N. Janes, G. L. Turner, S. L. Lambert, L. B. Welsh, and E. Oldfield, "Solid-state oxygen-17 nuclear magnetic resonance spectroscopic study of zeolites and related systems. II.," J. Amer. Chem. Soc. 108, 7236-7241 (1986).
17. W. H. Yang, R. J. Kirkpatrick, and G. Turner, " $^{31}\text{P}$  and  $^{29}\text{Si}$  MASS NMR investigation of the structural environment of phosphorus alkaline-earth silicate glass," J. Amer. Ceram. Soc. 69, C222-C223 (1986).
18. C. T. G. Knight, G. L. Turner, and E. Oldfield, "Solid-state tungsten-183 nuclear magnetic resonance spectroscopy," J. Amer. Chem. Soc. 108, 7426-7427 (1986).
19. G. L. Turner, K. A. Smith, R. J. Kirkpatrick, and E. Oldfield, "Structure and cation effects on phosphorus-31 NMR chemical shifts and chemical-shift anisotropies of orthophosphates," J. Magn. Reson. 70, 408-415 (1986).
20. G. L. Turner, R. J. Kirkpatrick, S. Risbud, and E. Oldfield, "Multi-nuclear magic-angle sample spinning nuclear magnetic resonance spectroscopic studies of crystalline and amorphous ceramic materials," J. Amer. Ceram. Soc. 66, 656-663 (1987).

21. R. Oestrike, A. Navrotsky, G. L. Turner, B. Montez, and R. J. Kirkpatrick, "The structural state of aluminum at low concentrations in  $2\text{PbO} \cdot \text{B}_2\text{O}_3$  glasses used for solution calorimetry: An aluminum-27 NMR study," Amer. Mineral. 72, 788-791 (1987).
22. B. C. Bunker, D. R. Tallant, C. A. Balfe, R. J. Kirkpatrick, G. L. Turner, and M. R. Reidmeyer, "Structure of phosphorus oxynitride glasses," J. Amer. Ceram. Soc. 70, 675-81 (1987).
23. T. H. Walter, G. L. Turner, and E. Oldfield, "Oxygen-17 cross-polarization nuclear magnetic resonance spectroscopy of inorganic solids," J. Magn. Reson. 76, 106-120 (1988).
24. J. Lipowitz and G. L. Turner, " $^{29}\text{Si}$  and  $^{13}\text{C}$  magic angle sample spinning nuclear magnetic resonance spectroscopy of amorphous ceramic fibers prepared by prolysis of organosilicon polymers," Polymer Preprints 29, 74-77 (1988).
25. R. C. Bunker, D. R. Tallant, T. J. Hendley, G. L. Turner, and R. J. Kirkpatrick, "The structure of leached sodium borosilicate glass," Phys. Chem. Glass. 29, 106-120 (1988).
26. B. C. Bunker, C. H. F. Peden, D. R. Tallant, S. L. Martinez, and G. L. Turner, "Raman and NMR studies of hydrous sodium titanates," Mat. Res. Soc. Symp. Proc. 121, 105-109 (1988).
27. K. L. Geisinger, R. Oestrike, A. Navrotsky, G. L. Turner, and R. J. Kirkpatrick, "Thermochemistry and structure of glasses along the join  $\text{NaAlSi}_3\text{O}_8$ ,  $\text{NaBSi}_3\text{O}_8$ ," Geochim. Cosmochim. Acta. 52, 2405-2414 (1988).
28. B. C. Bunker, D. R. Tallant, R. J. Kirkpatrick, and G. L. Turner, "Multinuclear nuclear magnetic resonance and Raman investigation of sodium borosilicate glass structures," Phys. Chem. Glasses 31, 30-41 (1990).
29. R. K. Brow, R. J. Kirkpatrick, and G. L. Turner, "Local structure of  $\text{XAl}_2\text{O}_3 \cdot (1-x)\text{NaPO}_3$  glasses: an NMR and xps study," J. Amer. Ceram. Soc. 78, 2293-2300 (1990).
30. R. K. Brow, R. J. Kirkpatrick, and G. L. Turner, "The short range structure of sodium phosphate glasses .I. MAS NMR studies," J. Non-Cryst. Solids 116, 39-45 (1990).
31. J. Lipowitz and G. L. Turner, " $^{29}\text{Si}$  and  $^{13}\text{C}$  magic angle sample spinning nuclear magnetic resonance spectroscopy of ceramic fibers prepared by prolysis of organosilicon polymers," in Solid State NMR of Polymers, L. J. Mathias, ed., Plenum Press, 305-320 (1991).

32. R. K. Brow, C. C. Phifer, G. L. Turner, and R. J. Kirkpatrick, "Cation effects on  $^{31}\text{P}$  MAS NMR chemical shifts of metaphosphate glasses," J. Amer. Ceram. Soc. 74, 1287-90 (1991).
33. B.C. Bunker, R.J. Kirkpatrick, R.K. Brow, G.L. Turner, and C. Nelson, "Local structure of alkaline earth boroaluminate crystals and glasses: II. Boron-11 and aluminum -27 MAS NMR spectroscopy of alkaline earth boroaluminate glasses," J. Amer. Ceram. Soc. 74, 1430-8 (1991).
34. E. Oldfield, J. Chung, H. B. Le, T. Bowers, J. Patterson, and G. L. Turner, "Differential linebroadening in coupled carbon-13 magic-angle sample-spinning nuclear magnetic resonance spectra of solid polymers," Macromolecules, 25, 3027-30 (1992).
35. R. K. Brow, R. J. Kirkpatrick, G. L. Turner, "Nature of alumina in phosphate glass. II. Structure of sodium aluminophosphate glass," J. Amer. Ceram. Soc. 76(4), 919-28 (1993).
36. A. K. Jameson, C. J. Jameson, A. C. de Dios, E. Oldfield, R. E. Gerald, and G. L. Turner, " $^{129}\text{Xe}$  magic-angle spinning of xenon in zeolite NaA. Direct observation of mixed clusters of co-adsorbed species," Solid State Nucl. Magn. Reson. 4(1), 1-12 (1994).
37. J. L. Bass and G. L. Turner, "Anion distributions in sodium silicate solutions. Characterization by  $^{29}\text{Si}$  NMR, infrared spectroscopy and vapor phase osmometry," J. Phys. Chem., 101(50), 10638-10644 (1997).
38. J. L. Bass, G. L. Turner and M. D. Morris, "Vibrational and  $^{29}\text{Si}$  NMR Spectroscopies of Soluble Silicate Oligomers," Macromol. Symp., 140, 263-270 (1999).

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## DECLARATION OF DR. BALA DHANDAPANI

I, Bala Dhandapani, residing at 30 Marion Circle, Eastampton, NJ 08060, declare and state that:

1. I received a Bachelor of Science Degree in Chemical Engineering from Anna University, Madras, India. I received a Doctorate Degree in Chemical Engineering in 1993 and a Masters of Science Degree in Chemical Engineering in 1990 from the Clarkson University, Potsdam, NY.
2. From 1997 to present, I have been employed as a Project Manager at BlackLight Power Inc., Cranbury, NJ, where I manage and conduct synthesis and characterization of novel hydride compounds.
3. From 1994-1997, I was employed as a Postdoctoral Research Associate and Laboratory Coordinator at Virginia Tech, Blacksburg, VA, Environmental Catalysis and Materials Laboratory, where I conducted synthesis, characterization, testing and development of novel catalytic materials for various environmentally significant reactions. I also managed the research activities of the lab of 12 researchers, including doctoral, masters and undergraduate students.
4. From 1990 - 1993, I was employed as a Research Assistant at Clarkson University, Potsdam, NY, wherein I studied the application of foam and monolith substrates for environmental catalysis. I also designed and constructed a reactor system with advanced instrumentation.
5. From 1988-1990, I was employed as an Instructor/Teaching Assistant at Clarkson University, where I taught the following courses: Unit Operations Laboratory, Reaction Engineering and Analysis, Advanced Reactor Design, Heterogeneous Catalysis, Material Science and Corrosion Engineering Laboratory.
6. I am experienced on the following instrumentation: AMETEK Quad Mass Spectrometer; Varian 3700 Gas Chromatograph; ISI-40 Scanning Electron Microscope; Siemens D 500 X-ray Diffractometer; Micromeritics ASAP 2010 Chemi; CHNS-EA1180 Elemental Analyzer; Perkin Elmer PHI 5300 ESCA; BioRad FT-60 Infrared spectroscopy; Mariner ESI-ToF Mass Spectrometer; HP 5890 and 6890 Gas Chromatograph; HP1100 HPLC; and Kratos XSAM800 XPS.
7. My research experience includes the synthesis of novel materials including: high surface area catalytic materials including monometallic and bimetallic transition metal carbides, nitrides, phosphides, hydrides and sulfides; noble metals and transition metal oxides; active catalytic materials supported on alumina, activated carbon, silica and titania; and high surface area activated carbon and silica from various precursors.
8. My research experience also includes the characterization of materials using the following techniques: X-ray diffraction; X-ray photoelectron spectroscopy; FTIR spectroscopy; Electrospray Ionization Time of Flight Mass Spectroscopy; Time of Flight Secondary Ion Mass Spectroscopy; Solids Probe Mass Spectroscopy (Quadrupole,

Magnetic Sector and Time of Flight); Proton Nuclear Magnetic Resonance; Scanning Electron Microscopy; Physisorption and Chemisorption techniques; Temperature programmed experiments; and Conductivity measurements Inductively Coupled Plasma Mass Spectrometry (elemental analysis).

9. My research experience further includes the development of catalytic materials, including: Optimization of synthesis conditions; Inclusion of additives, stabilizers and binders; and Fabrication of catalysts on monolith and foam substrates.

10. My research experience further includes the testing and evaluation of catalysts, including: Ozone decomposition reaction; Hydrogenation of aromatic compounds; Hydrodenitrogenation (HDN), hydrodesulfurization (HDS), hydrodeoxygenation (HDO) of various model compounds at high pressure reaction conditions; Hydrodechlorination (HDC) of chlorofluorocarbons; and Reforming of methane using membrane and plug flow reactors.

11. My research experience further includes kinetics and mechanism, including: Catalytic ozone decomposition reaction; Hydrogenation of isopropyl benzene; Simultaneous HDN, HDS and HDO of various heterocyclic aromatic compounds; and Hydrodechlorination of CFC-12 to HCFC-22 and HFC-32.

12. A selected list of my publications is attached.

13. I supervised the preparation of the compounds shown in the following Tables 1 and 2. Table 1 includes new compounds comprising hydrinos formed using catalysts for forming hydrinos (lower energy hydrogen) from hydrogen. The process used for forming the compounds comprising hydrinos is described in Dr. Randell L. Mills U.S. serial No. 09/009,294 and published PCT/US98/14029 application. Table 2 includes control compounds comprising conventional elements and energy states.

14. Blind samples of the compounds were sent to Dr. Gary L. Turner of Spectral Data Services, Inc. to conduct Nuclear-Magnetic-Resonance (NMR) evaluation of the samples. The results of the NMR analysis is shown in the Tables 1 and 2.

Summary of new hydrino hydride compounds that showed novel features with solid state MAS  $^1\text{H}$  NMR spectroscopy

Table 1

Compound	Data file	Reactants	$^1\text{HNMR}$ Features
KHI	blps00as.14	KI, K, $\text{H}_2$	-2.5*, 1.1
KHI	blps0095.005	K, KI, $\text{H}_2$	-3.2*, 0.9
KHCl	bpls99as.078	K, KCl, $\text{H}_2$	-4.4*, 4, 1.1
KHBr	bpls99as.058	K, KBr, $\text{H}_2$	-4.1*, 5.9, 4.3, 1.2
RbHF	bpls99as.034	RbF, K, $\text{H}_2$	-4.4*, 1.2

\* novel features



## Summary of relevant controls performed

Table 2

Control Compound	Data File	<sup>1</sup> H NMR Features
KH	blps00as.038	1.1, 0.8, 4.6
KH + KI	blps00as.099	1.1, 0.8, 4.5
KH + KCl	blps00as.097	1.1, 0.7, 4.3
KH + KBr	blps00as.101	1.1, 0.8, 4.2
RbH	textfr.1.txt	0.83, 4.0
RbH + RbF	blps00as.103	1.0, 4.9

1.1, 1.0, 0.8, 0.7 ppm is associated with M-H (where M is K or Rb),  
4-4.9 ppm is associated with M-OH (where M is K or Rb)

15. I analyzed XPS and TOFSIMS spectroscopy to determine the elements (cations and anions), such as the potassium and halides, present in each of the compounds. I also performed a Gas Chromatograph (GC) to determine whether hydrogen present in each of the compounds.

## CONCLUSIONS

16. Negative numbers in the compounds of Table 1 represent an upfield shift, which means that the electron is closer to the proton in the hydrogen. Thus, the upfield chemical shifts observed by the NMR data indicate that new lower energy states for the hydride ions (hydrino hydride ions) may exist.

17. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

By D. Dhandapani  
Dr. Bala Dhandapani

Date: 8/18/2000

## SELECTED PUBLICATIONS

J. Y. Wang, B. Dhandapani, D-T. Chin, An Experimental Study of Mass Transfer in Pulse Reversal Plating, *Journal of Applied Electrochemistry*, 22, 240, 1992.

D-T. Chin and B. Dhandapani, An Experimental Study of Metal Distribution in Pulse Plating, *Electrochemica Acta*, 37, 1927, 1992.

B. Dhandapani and S. T. Oyama, Novel Catalysts for Selective Dehalogenation of CCl<sub>2</sub>F<sub>2</sub> (CFC-12), *Catal. Lett.*, 35, 353, 1995.

B. Dhandapani and S. T. Oyama, Kinetics and Mechanism of Ozone Decomposition on Manganese Oxide Catalyst, *Chem. Lett.*, 413, 1995.

B. Dhandapani and S. T. Oyama, Gas Phase Ozone Decomposition Catalysts, *Applied Catalysis: Environmental*, 11, 129, 1997.

C. C. Yu, S. Ramanathan, B. Dhandapani, J. G. Chen and S. T. Oyama, Bimetallic Nb-Mo Hydroprocessing Catalysts: Synthesis, Characterization and Activity Studies, *J. Phys. Chem.*, 101, 512, 1997.

J. Wen, B. Dhandapani, S. T. Oyama and G. L. Wilkes, Preparation of Highly Porous Silica Gel from Poly(tetra methylene oxide) (PTMO)/Silica Hybrids, *Chem. Mater.*, 9, 1968, 1997.

B. Dhandapani, S. Ramanathan, C. C. Yu, J. G. Chen and S. T. Oyama, Synthesis, Characterization and Reactivity Studies of Supported Mo<sub>2</sub>C with Phosphorus Additive, *J. Catal.*, 176, 1998.

B. Dhandapani, T. P. St.Clair and S. T. Oyama, Simultaneous Hydrodesulfurization, Hydrodeoxygenation and Hydrogenation with Molybdenum Carbide, *Applied Catalysis, A: General*, 168, 219, 1998.

Wei Li, B. Dhandapani and S. T. Oyama, Preparation and Characterization of Molybdenum Phosphide: A Novel Catalyst for Hydrodenitrogenation, *Chem. Lett.*, 207, 1998.

T. P. St.Clair, B. Dhandapani and S. T. Oyama, Cumene Hydrogenation Turnover Rates on Molybdenum Carbide: CO and O<sub>2</sub> as Probes of the Active Sites: *Catal. Lett.*, 58, 169, 1999.

P. A. Clark, B. Dhandapani and S. T. Oyama, Preparation and hydrodenitrogenation performance of Rhenium Nitride, *Applied Catalysis, A: General*, 184, L 175, 1999.

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B. Dhandapani, S. Ramanathan, C. C. Yu and S. T. Oyama, Study of Supported Bimetallic Oxycarbide Catalysts, submitted to Applied Catalysis.

B. Dhandapani, N. Greenig, J. He and R. Mills, Synthesis and Characterization of Novel Alkali Metal Halide Hydrides, submitted for publication, The International Journal of Hydrogen Energy.

B. Dhandapani, Wei Li and S. T. Oyama, Ozone Decomposition on Noble Metals and Metal Oxides, manuscript under preparation.

D-T. Chin, B. Dhandapani, J. Y. Wang, Mass Transfer in Pulse Reversal Plating, 42 nd ISE Meeting, Aug. 1991, Montreux, Switzerland.

B. Dhandapani and D-T. Chin, Experimental Study of Metal Distribution in Pulse Plating, , AIChE National Meeting, Nov. 1992, Miami, Florida.

B. Dhandapani, S. Ramanathan, C. C. Yu and S. T. Oyama, Hydrotreatment Reactions on Novel Carbide Catalysts, Tri-State Catalyst Club Symposium on Heterogeneous and Homogeneous Catalysis, May 1996, Charleston, WV.

B. Dhandapani, T. P. St.Clair and S. T. Oyama, Simultaneous Removal of Aromatics, Sulfur and Oxygen Compounds using Novel Carbide Catalysts, 212 th ACS National Meeting, August 1996, Orlando, Florida, USA.

B. Dhandapani, J. He and R. Mills, Synthesis and Characterization of Novel Hydrides, 45 th ACS, Western Regional Meeting, Oct 1999, Ontario, California, USA.

B. Dhandapani, N. Greenig, J. He and R. Mills, Novel Alkaline and Alkaline Earth Hydrides, National Hydrogen Association, February 2000, Vienna, Virginia, USA.

B. Dhandapani, M. Nansteel, J. He and R. Mills, Novel Inorganic Hydrides, ACS National Meeting, March 2000, San Francisco, California, USA.

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